7. (Once Amended) A voice compression apparatus as recited in claim 2, wherein said super-frame encoder includes a quantizer of linear prediction parameters, wherein quantization is performed with a codebook-based interpolation of linear prediction parameters that employ different interpolation coefficients for each linear prediction parameter, and wherein said quantizer operates in closed loop mode to minimize overall error over a number of frames.

12. (Once Amended) A voice compression apparatus as recited in claim 11, wherein said pitch smoother classifies frames into onset and offset frames based on at least four waveform feature parameters selected from the group of waveform feature parameters consisting of energy zerocrossing rate, peakiness, maximum correlation coefficient of input speech, maximum correlation coefficient of 500 Hz low pass filtered speech, energy of low pass filtered speech, and energy of high pass filtered speech.

18. (Once Amended) A voice compression apparatus, comprising:

(a) a superframe buffer for receiving multiple frames of voice data;

(b) a frame-based analysis module for determining a set of voice data parameters for said voice data; and

(c) a super-frame encoder for receiving unquantized voice data parameters for groups of frames within a superframe, said superframe encoder comprising

(i) a pitch smoother for determining pitch and U/V decisions for each frame of the superframe and for extracting parameters needed for frame classification into onset and offset frames,

(ii) a bandpass voicing smoother for determining bandpass voicing strengths for the frames within the superframe and for determining cutoff frequencies for each frame, and

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(iii) a parameter quantizer and encoder for quantizing and encoding voicing parameters received from said analysis module, said pitch smoother, and said bandpass voicing smoother into a set of bits and encoding said bits into an outgoing digital bit stream for transmission.

20. (Once Amended) A method of decoding a parametric voice encoded data stream into an audio voice signal comprising the steps of:

(a) buffering a received parametric voice data stream having a plurality of pitch periods;

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(b) constructing an estimated spectrum of excitation within each pitch period by breaking down the frequency spectrum into regions based on a cutoff frequency, wherein said construction comprises the steps of:

(i) computing a Fourier magnitude for each region, wherein the resultant computed Fourier magnitude for at least one of said regions is then scaled by a gain factor computed for that region,

(ii) computing phase within each region, wherein the resultant phase for at least one of said regions has been modified by use of a weighted random phase, and

(iii) converting said Fourier magnitude and said phase within each region to a time domain representation by the computation of an inverse discrete Fourier transform; and

(c) generating an analog voice signal from said time domain representation.

21. (Once Amended) A method as recited in claim 20, wherein said regions into which the frequency spectrum is broken down comprise:

(a) a lower region wherein Fourier magnitudes directly determine the spectrum;

(b) a transition region wherein Fourier magnitudes are scaled down by a linearly decreasing weighting factor that drops from unity to a nonzero positive value dependent on the cutoff frequency of the current frame; and

(c) an upper region wherein Fourier magnitudes are scaled down by a weighting factor dependent on the cutoff frequency of the current frame.

23. (Once Amended) A down-transcoder apparatus which receives an encoded frame-based voice data stream and converts it into a superframe-based encoded voice data stream, comprising:

(a) a superframe buffer for collecting a number of frames of parametric voice data and extracting bits representing frame-based voice parameters;

(b) a decoder for inverse quantizing the bits for each frame of parametric voice data into quantized parameter values for each frame; and

(c) a superframe encoder for collecting said quantized frame-based parameters for the group of frames within the superframe, producing a set of parametric voice data, and quantizing and encoding said parametric voice data into an outgoing digital bit stream.

Please add claims 26-30 as follows:

26. (New) A method of encoding an audio voice signal comprising:

receiving a superframe comprised of a plurality of frames of voice data corresponding to the audio voice signal;

determining for each frame in the superframe a set of unquantized voice data parameters;

determining pitch and U/V decisions for each frame in the superframe, and extracting parameters for frame classification from each frame in the superframe;

determining bandpass voicing strengths and cutoff frequencies for the frames within the superframe; and

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quantizing the voice data parameters, pitch, U/V decision, frame classification, bandpass voicing strengths and cutoff frequencies into a set of bits and encoding the set of bits.

27. (New) A computer-readable medium having thereon computer-readable instructions for performing a method of encoding an audio voice signal comprising the steps of:

receiving a superframe comprised of a plurality of frames of voice data corresponding to the audio voice signal;

determining for each frame in the superframe a set of unquantized voice data parameters;

determining pitch and U/V decisions for each frame in the superframe, and extracting parameters for frame classification from each frame in the superframe;

determining bandpass voicing strengths and cutoff frequencies for the frames within the superframe; and

quantizing the voice data parameters, pitch, U/V decision, frame classification, bandpass voicing strengths and cutoff frequencies into a set of bits and encoding the set of bits.

28. (New) A computer-readable medium having thereon computer-readable instructions for performing a method of producing digitized voice from superframe-based parametric voice data comprising the steps of:

receiving superframe-based parametric voice data;

decoding and inverse quantizing the voice data to recreate a set of frame-based voice parameter values; and

decoding the frame-based voice parameter values with a frame-based voice synthesizer which decodes the frame-based voice parameters to produce a digitized voice output.

29. (New) A method of up-transcoding a superframe-based encoded voice data stream to a frame-based encoded voice data stream comprising:

receiving superframe data and extracting bits representing superframe parameters, whereby each superframe is associated with one set of superframe parameters;

inverse quantizing the bits for each set of superframe parameters into a plurality of sets of parameter values for the frames of the associated superframe so that each frame is associated with a set of parameter values; and

quantizing the parameter values for each frame and producing a frame-based data stream.

30. (New) A method of down-transcoding a frame-based encoded voice data stream to a superframe-based encoded voice data stream comprising:

receiving a plurality of frames of frame-based parametric voice data and extracting bits representing quantized frame-based voice parameters;

B7 inverse quantizing the frame-based voice parameters into a set of parameter values for each frame; and

quantizing the parameter values for the frames in the plurality of frames into a set of superframe-based parametric voice data and producing a superframe-based data stream.

REMARKS

Claims 1-30 are pending in this application, with claims 26-30 being newly added by way of this response. Claims 3, 7, 12, 18, 20-21, and 23 are amended herein to correct minor informalities. Each previously pending claim has been rejected as obvious. In particular, claims 1-6 and 10-25 stand rejected under 35 U.S.C. § 103 as obvious in view of U.S. Pat. No. 6,199,037 to Hardwick (hereinafter referred to as "*Hardwick*"), and claims 7-9 stand rejected under § 103 as obvious over *Hardwick* further in view of U.S. Pat. No. 6,202,045 to Ojala (hereinafter referred to as "*Ojala*"). Applicants respectfully submit that the pending claims are not obvious in view of the cited references primarily because the cited references do not teach, singly or in combination, each element of any of the claims.

Independent Claims 1-2, 18-19, and 24-25

Independent claims 1-2, 18-19, and 24-25 stand rejected as obvious in view of *Hardwick*. In particular, the Office action states that each element of each of these claims is found in *Hardwick* except for the element of a superframe buffer. It is respectfully submitted that, as discussed hereinafter, there are other limitations as well in each rejected claim that are not found in, or obvious in view of, any cited reference.